

REMARKS

Claims 19-26, 31, 32, and 34-36, of which claim 19 is independent in form, are presented for examination.

Information Disclosure Statement

Applicants filed an Information Disclosure Statement in this application on February 1, 2005. Applicants request that the Examiner review the references cited therein and provide Applicants with confirmation that the references have been reviewed.

Objection to Specification Under 35 U.S.C. § 132 and

Rejection of Claims Under 35 U.S.C. § 112

The Examiner has objected to the Amendment mailed on November 23, 2004 under 35 U.S.C. § 132, as introducing new matter into the disclosure. Furthermore, the Examiner has rejected claims 19-26, 31, 32, and 34-36 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 19-26, 31, 32, and 34-36 cover a primary electrochemical cell including a cathode containing an aluminum current collector, an anode, and an electrolyte containing a lithium perchlorate salt and a lithium salt selected from lithium trifluoromethanesulfonate, lithium trifluoromethanesulfonimide, and lithium hexafluorophosphate. The molarity of lithium ions in the electrolyte is equal to the sum of the molarity of perchlorate ions in the electrolyte and the molarity of trifluoromethanesulfonate ions, trifluoromethanesulfonimide ions, or hexafluorophosphate ions in the electrolyte. According to the Examiner, the underlined subject matter is not supported by the original disclosure. (See January 31, 2005 Office Action, pages 1-2.)

But the underlined subject matter is fully described in the patent application. For example, Applicants' specification discloses:

an electrochemical cell 10 includ[ing] an anode 12 in electrical contact with a negative lead 14, a cathode 16 in electrical contact with a positive lead 18, a separator 20 and an electrolytic solution. . . . The electrolytic solution includes a solvent system and a salt that is at least partially dissolved in the solvent system.

The electrolyte . . . contains a lithium salt such as lithium trifluoromethanesulfonate (LiTFS) or lithium trifluoromethanesulfonimide (LiTFSI), or a combination thereof. . . . In some embodiments, the electrolyte may contain LiPF₆ [lithium hexafluorophosphate]; in other embodiments, the electrolyte is substantially free of LiPF₆. The electrolyte also contains a perchlorate salt, which inhibits corrosion in the cell. Examples of suitable salts include lithium, barium, calcium, aluminum, sodium, potassium, magnesium, copper, zinc, ammonium, and tetrabutylammonium perchlorates. (Application, pages 4-5, emphasis added.)

Clearly, Applicants' specification provides support for an electrochemical cell including an electrolyte containing lithium trifluoromethanesulfonate, lithium trifluoromethanesulfonimide, and/or lithium hexafluorophosphate. Furthermore, Applicants' specification states that the electrolyte includes a perchlorate salt to inhibit corrosion, and that lithium perchlorate is an embodiment of a perchlorate salt. In embodiments in which the perchlorate salt is lithium perchlorate, the molarity of lithium ions in the electrolyte of such an electrochemical cell is equal to the sum of the molarity of perchlorate ions in the electrolyte and the molarity of trifluoromethanesulfonate ions, trifluoromethanesulfonimide ions, or hexafluorophosphate ions in the electrolyte. This molarity relationship can exist, for example, when the cell has not yet been discharged, and when lithium perchlorate, lithium trifluoromethanesulfonate, lithium trifluoromethanesulfonimide, and/or lithium hexafluorophosphate are the only lithium and/or perchlorate salts that have been added to the cell electrolyte.

The Examiner has asserted that,

The molarity of lithium ions in the electrolyte would not be equal to the sum of the molarity of perchlorate ions in the electrolyte and the molarity of trifluoromethanesulfonate ions, trifluoromethanesulfonimide ions or hexafluorophosphate ions in the electrolyte if other salt, such as calcium perchlorate, is used. (January 31, 2005 Office Action, page 3.)

This statement is true, but irrelevant. Applicants' specification does not state that lithium perchlorate and another perchlorate salt generally are used together in the electrolyte of Applicants' electrochemical cell. Rather, as noted above, Applicants' specification states that,

The electrolyte also contains a perchlorate salt, which inhibits corrosion in the cell. Examples of suitable salts include lithium, barium, calcium, aluminum, sodium, potassium, magnesium, copper, zinc, ammonium, and tetrabutylammonium perchlorates. (Application, page 5, emphasis added.)

Thus, Applicants' specification describes a cell having an electrolyte that includes a perchlorate salt, for example, lithium perchlorate.

The Examiner also has asserted that,

[T]he mechanism of the discharge of a lithium anode is the oxidation of lithium to form lithium ions (Li^+). The lithium ions move through the electrolyte to the cathode, where it reacts to form a lithium compound. The molarity of lithium ions in the electrolyte of the electrochemical cell is not constant in the instant specification. (January 31, 2005 Office Action, page 3.)

But the molarity of lithium ions in the electrolyte of Applicants' electrochemical cell does not need to be constant in order to provide support for claims 19-26, 31, 32, and 34-36. For example, in a cell that includes an electrolyte containing lithium perchlorate and lithium trifluoromethanesulfonate, the molarity of lithium ions in the electrolyte prior to discharge of the cell (e.g., right after the cell has been assembled) is equal to the sum of the molarity of perchlorate ions in the electrolyte and the molarity of trifluoromethanesulfonate ions in the electrolyte. As Applicants noted in the Amendment filed on November 23, 2004, several of the electrochemical cells in Example 1 of Applicants' specification were prepared by adding a lithium perchlorate salt to an electrolyte that included a lithium trifluoromethanesulfonate salt. (See Application, pages 6-8.) After the addition of both the lithium trifluoromethanesulfonate salt and the lithium perchlorate salt into the electrolyte, the molarity of lithium ions in the electrolyte would have been equal to the sum of the molarity of perchlorate ions in the electrolyte and the molarity of trifluoromethanesulfonate ions in the electrolyte. The question of whether this molarity relationship might have changed during discharge of the cells is irrelevant.

Furthermore, the Examiner's statement regarding the discharge of a lithium anode (see January 31, 2005 Office Action, page 3) indicates that the Examiner has assumed that Applicants' cells always include a lithium anode. However, it is clear from Applicants' specification that Applicants' cells can have an anode that does not include lithium. For example, Applicants describe anode 12 of cell 10 as follows:

Anode 12 can consist of an active anode material, usually in the form of an alkali metal, e.g., Li, Na, K, or an alkaline earth metal, e.g., Ca, Mg. The anode can also consist of alloys of alkali metals and alkaline earth metals or alloys of alkali metals and Al. (Application, page 4.)

Clearly, Applicants' electrochemical cells do not have to have an anode that includes lithium.

Applicants believe that the specification provides support for the claimed subject matter. Thus, Applicants believe that the objection to the specification under 35 U.S.C. § 132 and the rejection of claims 19-26, 31, 32, and 34-36 under 35 U.S.C. § 112, first paragraph, should be reconsidered and withdrawn.

Claim Rejections – 35 U.S.C. § 103

The Examiner has noted that the rejections of claims 19-26, 31, 32, and 34-36 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,165,644 (Nimon) in view of U.S. Patent No. 6,001,509 (Kim), or as unpatentable over Nimon, Kim, and U.S. Patent No. 6,352,793 (Kitoh), have been withdrawn because independent claim 19 has been amended. However, the Examiner has reserved the right to reinstate the rejections should the alleged new matter in the claims be removed. Applicants do not consider the alleged new matter to be new matter, and thus have not removed it from the claims. Furthermore, Applicants believe that claims 19-26, 31, 32, and 34-36 are patentable over Nimon and Kim or Nimon, Kim, and Kitoh, at least for reasons including those previously provided by Applicants.

Applicants believe that claims 19-26, 31, 32, and 34-36 are in condition for allowance, which action is requested.


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Page : 11 of 11

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Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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